



# **Armed Forces College of Medicine AFCM**



# The Hand

# INTENDED LEARNING OBJECTIVES (ILO)



1. Define attachments, structures passing superficial and deep to flexor & extensor retinaculum
2. Identify fibrous flexor sheaths
3. List the attachments and function of palmar aponeurosis
4. Enumerate contents of facial compartments of palm
5. Enumerate boundaries, floor and contents of anatomical snuff box
6. Identify muscles of the hand & their nerve

# THE HAND



**palm of  
the  
hand**



**dorsum  
of the  
hand**

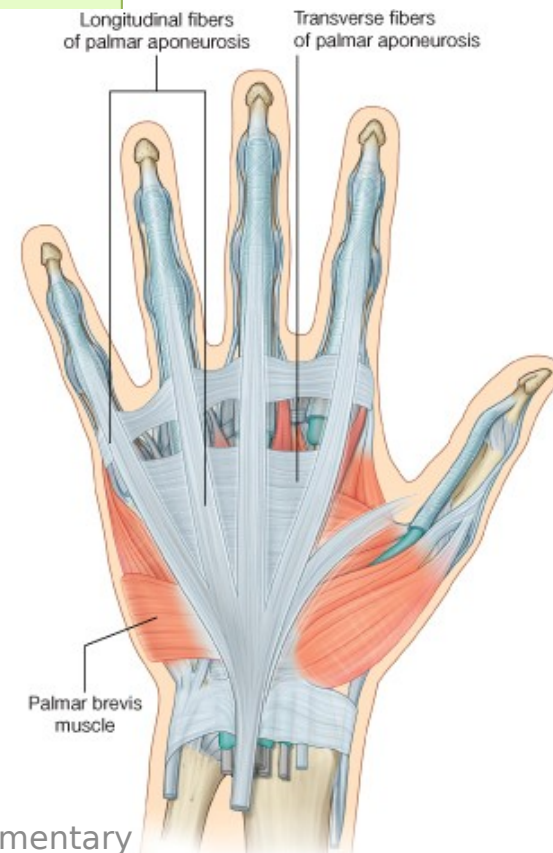
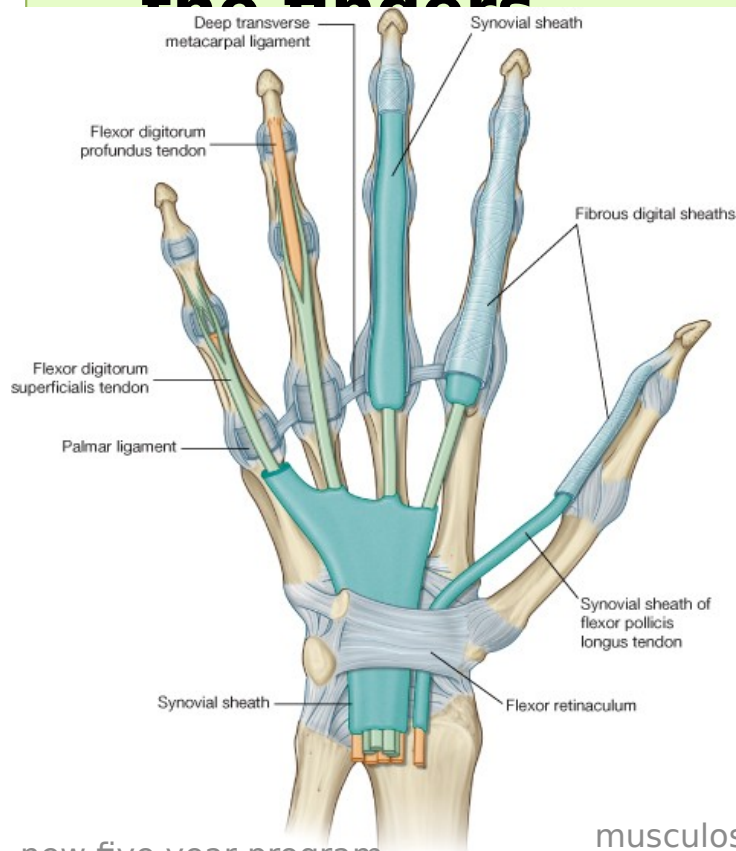


<https://en.wikipedia.org/wiki/Hand>

# Deep fascia of palm of the hand



1. Palmar aponeurosis
2. Flexor retinaculum
3. Fibrous flexor sheath of the fingers



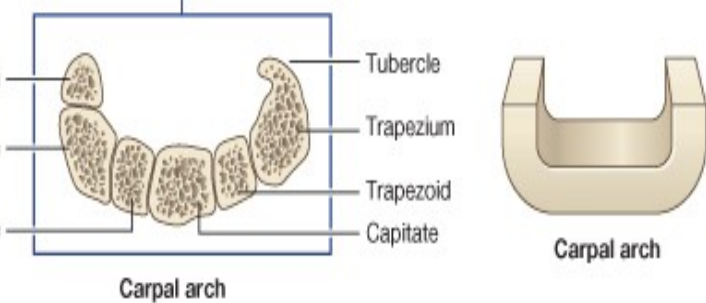
# Flexor Retinaculum of Wrist



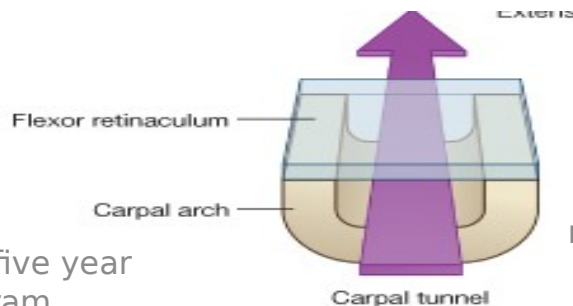
## **\*\*Definition:**

It is a thickened strong fibrous band of deep fascia which crosses in front of the carpus and converts its anterior concavity into the **carpal**

**tunnel**

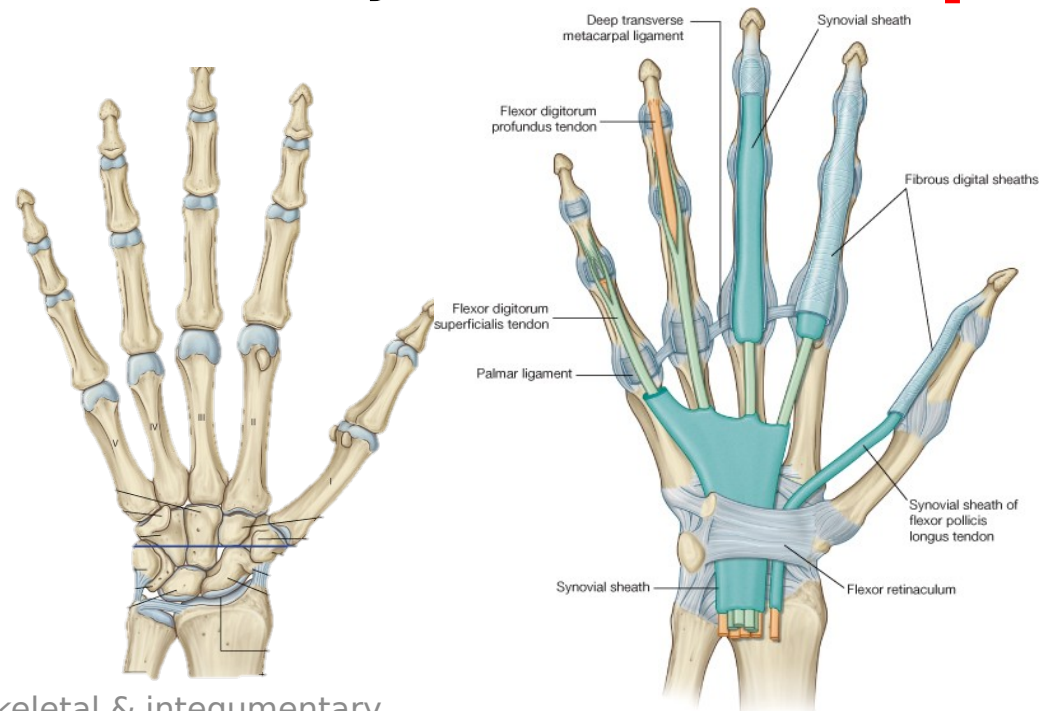


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new five year  
program

musculoskeletal & integumentary  
Module



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# Flexor Retinaculum of Wrist



❑ **Function :** prevents displacement of long flexor tendons during contraction

**It is attached to the**

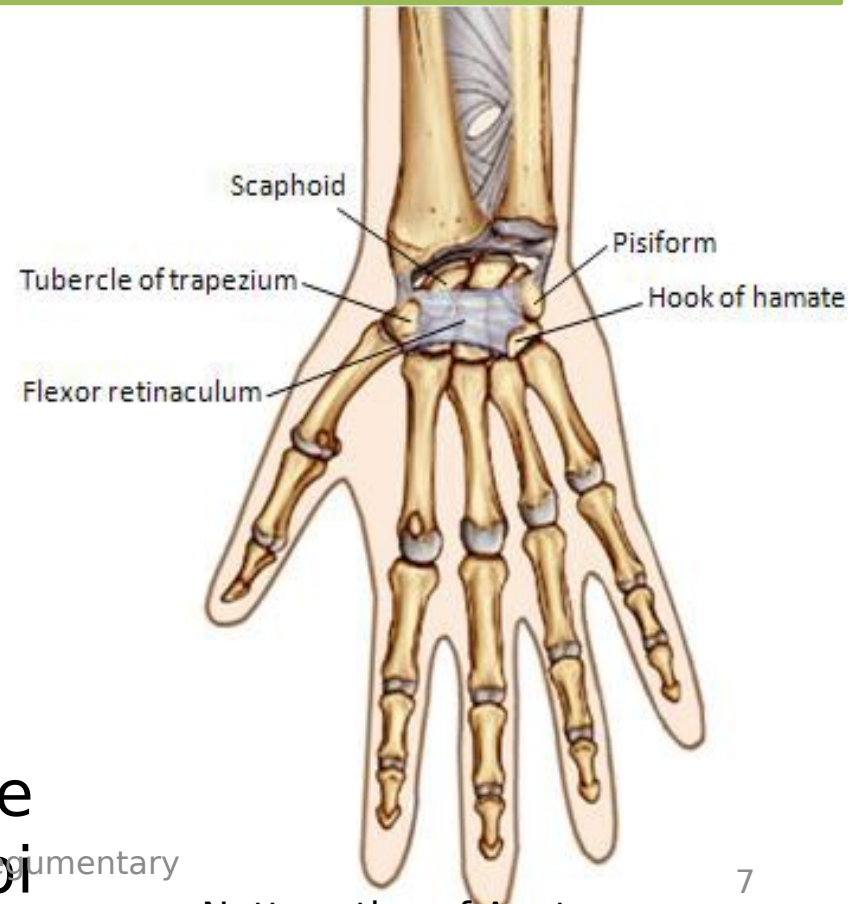
## **1. Medially:**

- pisiform
- hook of hamate.

## **2. Laterally:**

- scaphoid
- Trapezium

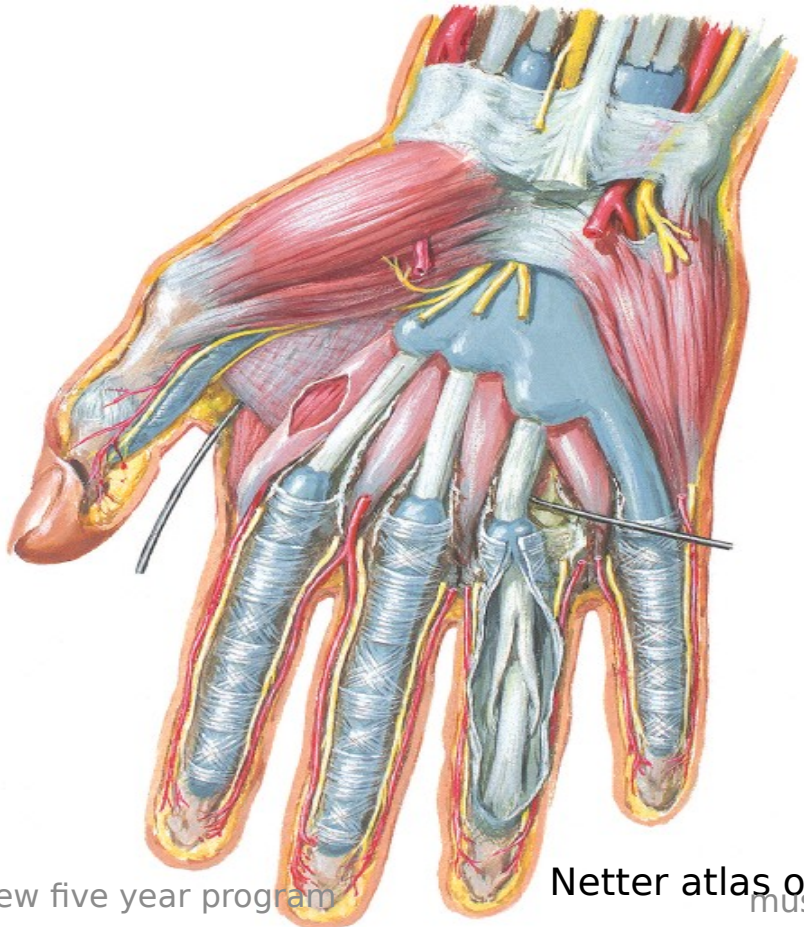
It splits into 2 laminae; a superficial one & a deep one for the tendon of flexor carpi radialis



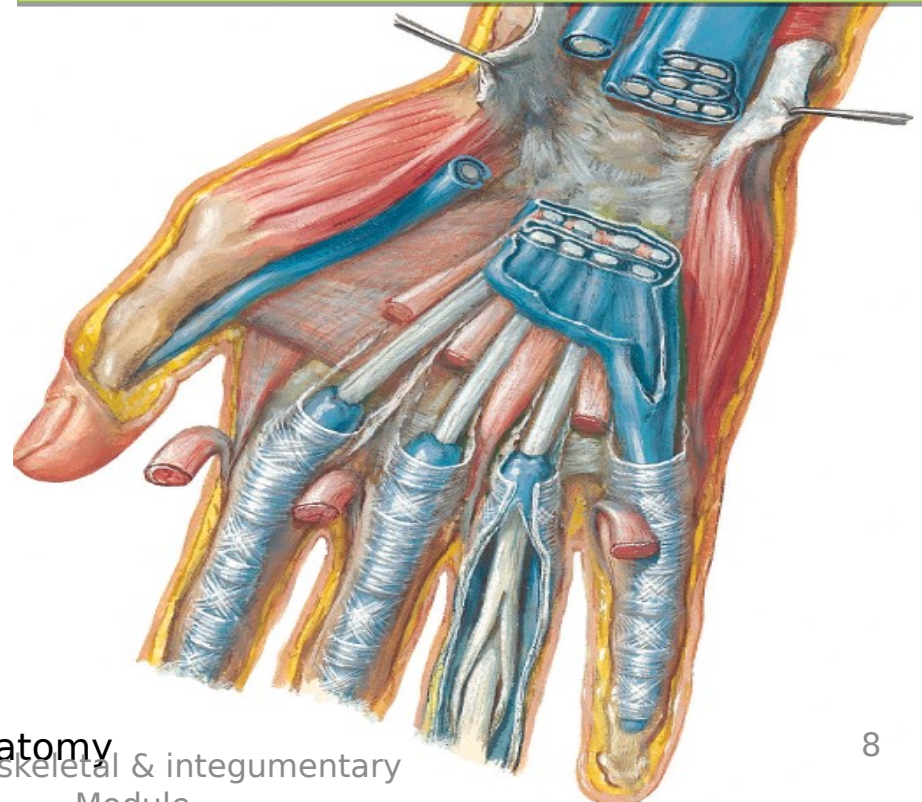
# Extensor Retinaculum of Wrist



## Structures passing **DEEP**



## Structures passing **SUPERFICIAL** (arranged from medial to lateral)



# Flexor Retinaculum of Wrist



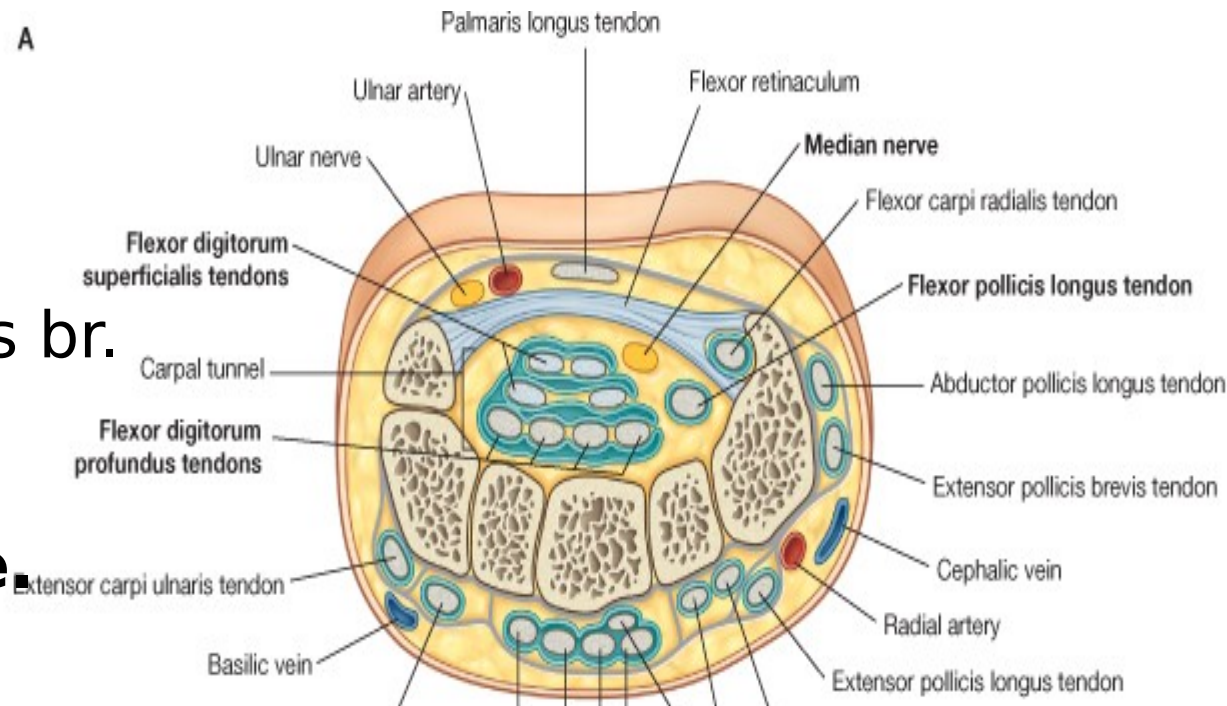
Structures passing **SUPERFICIAL** (arranged from medial to lateral)

❑ **Tendon of Palmaris Longus**

❑ **Ulnar nerve.**

❑ **Ulnar vessels.**

❑ Palmar cutaneous br. of  
✓ **ulnar nerve.**  
✓ **median nerve.**



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# Flexor Retinaculum of Wrist



Structures passing **DEEP** (*in the carpal tunnel*)

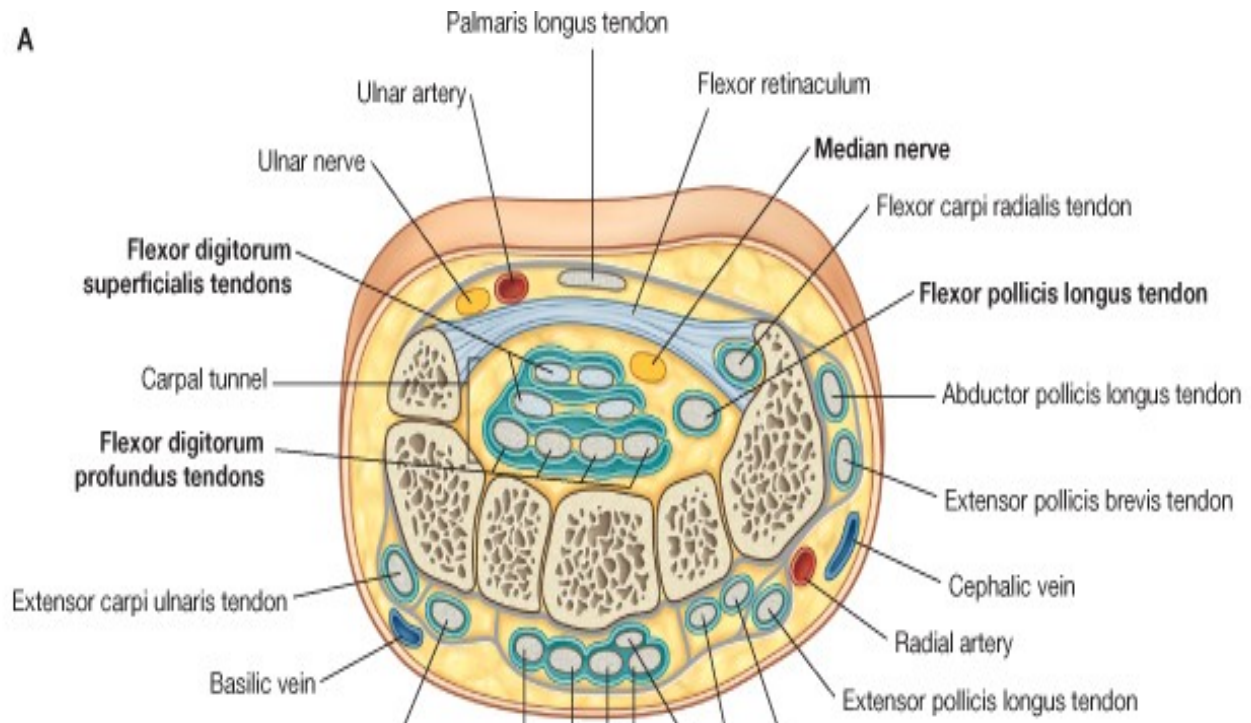
❑ Median nerve

❑ Tendons of

- fl. digit. superficialis.
- fl. digit. profundus.
- flexor pollicis longus
- flexor carpi radialis

❑ Common

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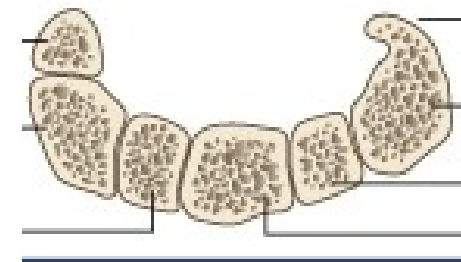
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# Clinical Anatomy- What is carpal tunnel syndrome?



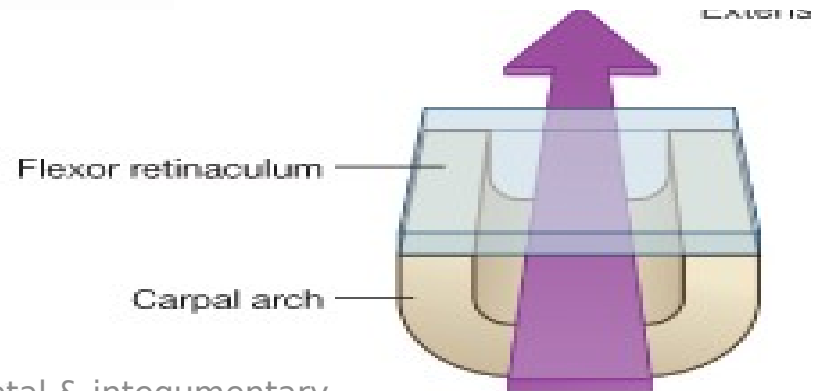
#ADAM.



Carpal arch



Carpal arch



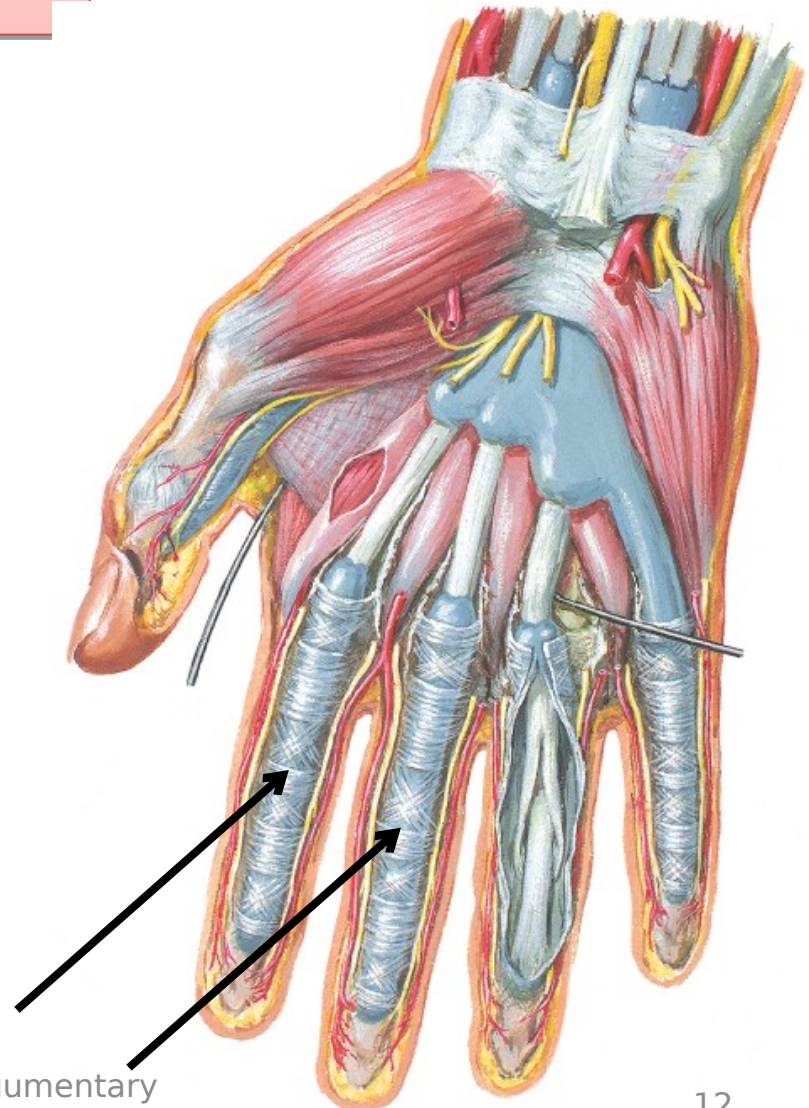
# Fibrous flexor sheaths

□ These are dense plates of **fibrous tissue** which arch across the **flexor tendons**

in the fingers.

## □ Function:

- Each forms with the phalanges a **tunnel** which is lined by a synovial sheath lubricating the movement of the tendon





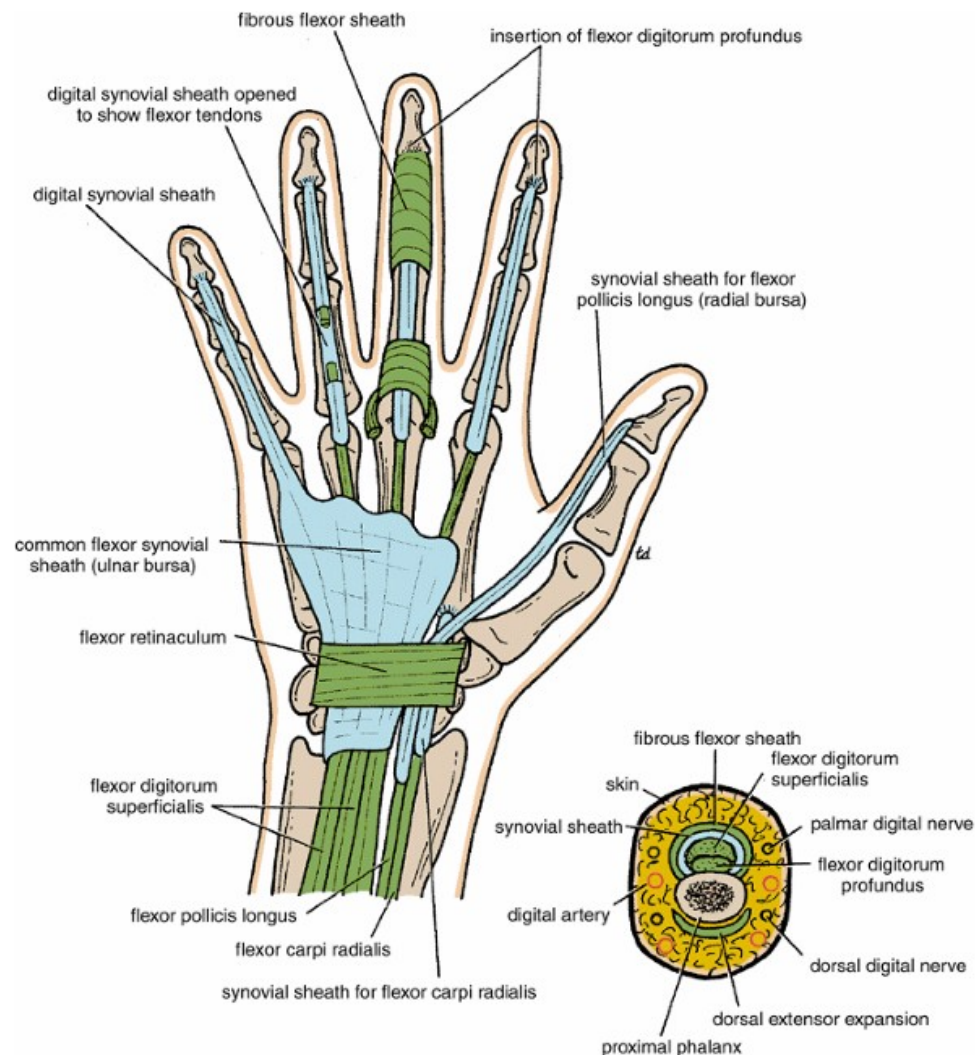
# Synovial Sheaths of Flexor Tendons

## □ Definition:

These are **tubular sacs** which surround the terminal parts of the **tendons** before its insertion

## □ Function:

to provide a sort of **lubrication** for it.



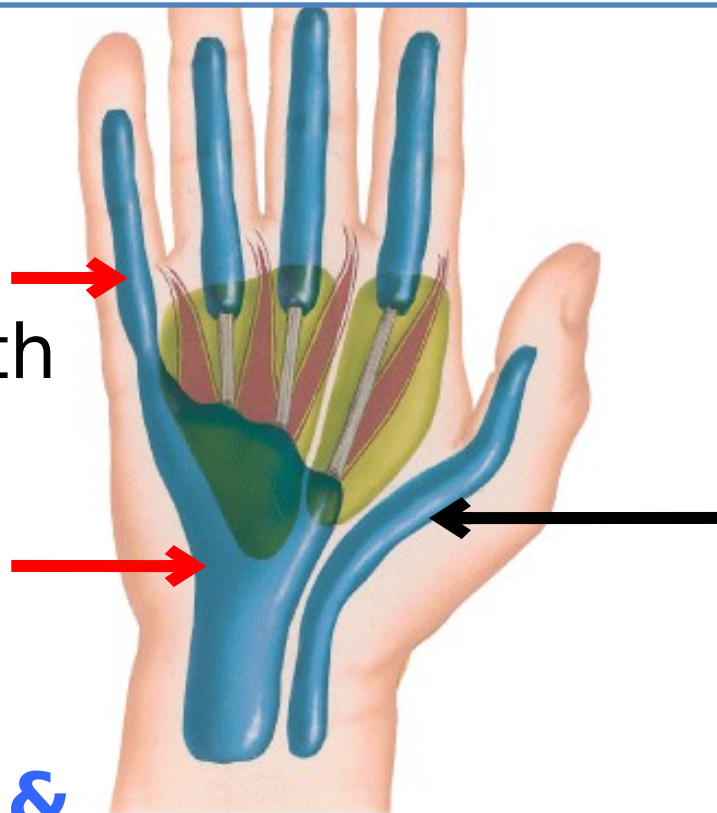


# Synovial Sheaths of Flexor Tendons

There are 3 sheaths that surround the long flexors

## 1- Ulnar bursa:

This is a common synovial sheath for the 8 tendons of flexor digitorum superficialis & profundus. It extends



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## 2- Radial bursa:

it surrounds tendon of Flexor pollicis longus and continues around the tendon till its

# Palmar Aponeurosis

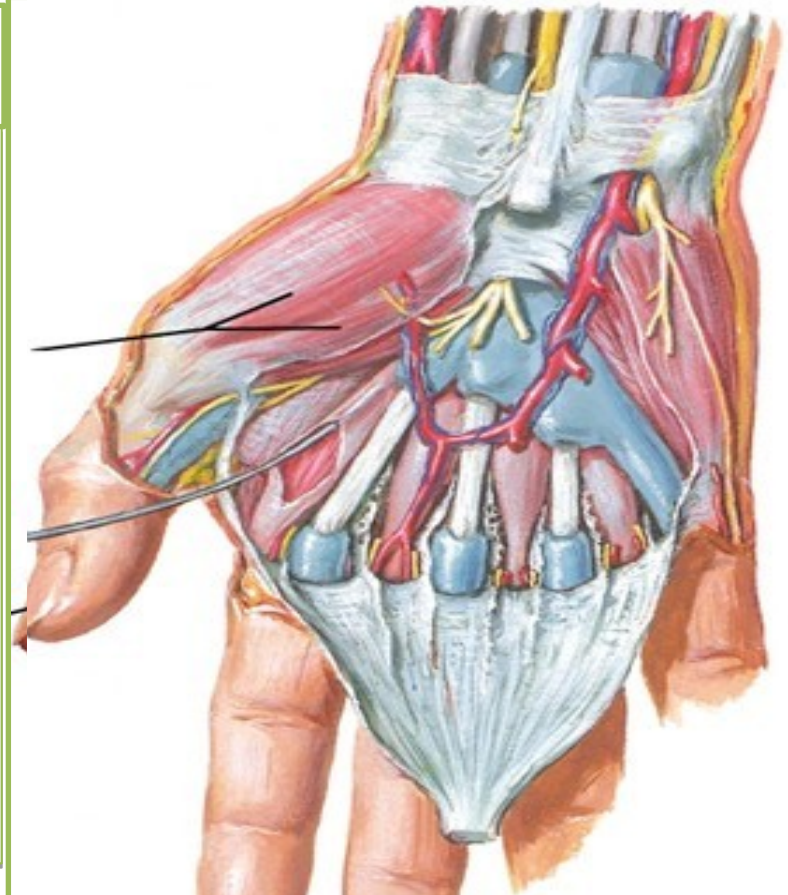


**Definition:** This is thick and strong fibrous sheet that covers the middle

## **\*\* Function:**

1- It is firmly attached to the overlying skin, so **it improves the gripping of the objects.**

2-Due to its toughness, it **protects the underlying structures**



# Palmar Aponeurosis

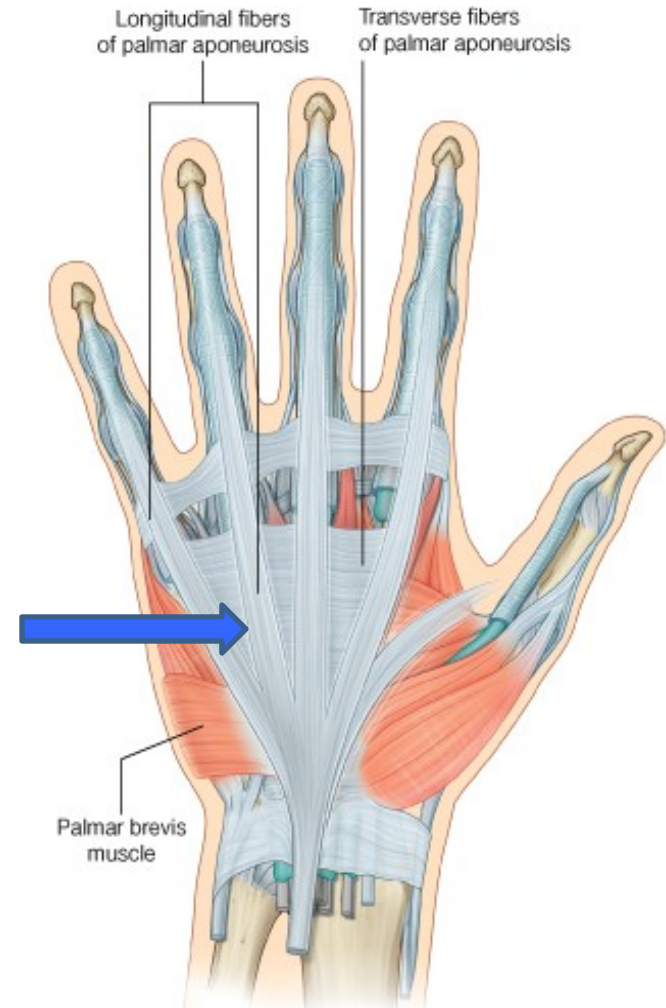


## Shape and attachments:

It is **triangular in shape** with its apex directed proximally and its base directed distally.

**1- The apex:** receives the insertion of Palmaris longus tendon.

**2- The base:** is divided



# Clinical Anatomy:

## *Dupuytren contracture of the hand*

is a deformity in the hand in which the medial part of the palmar aponeurosis undergoes fibrosis producing progressive shortening and flexion of the

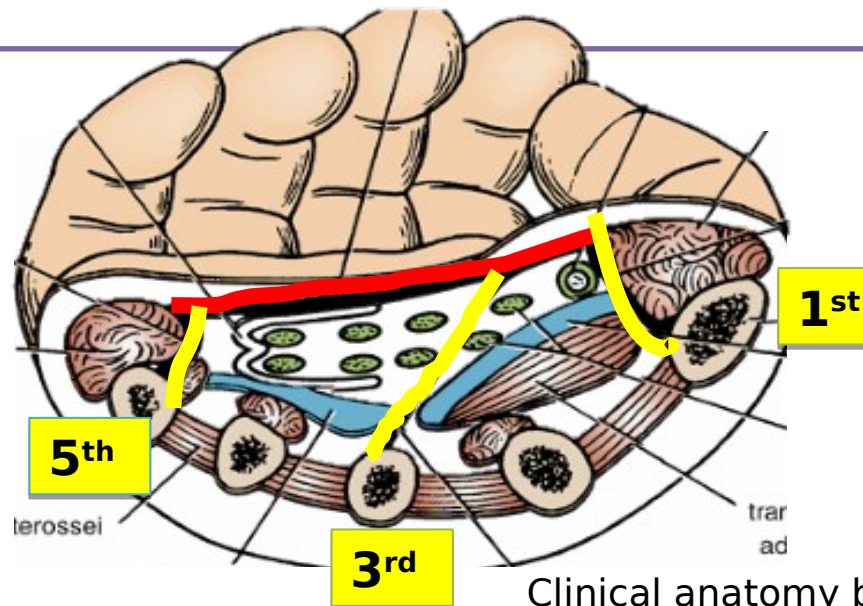




# Fascial Compartments of Palm

Each septum into the depth of the palm divided it into fascial compartments

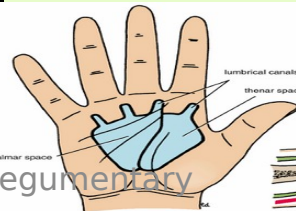
**Medial compartment:**  
contains  
hypothenar  
muscles



**Lateral compartment:**  
contains the  
thenar  
muscles

**Intermediate compartment:** deep to the palmar aponeurosis

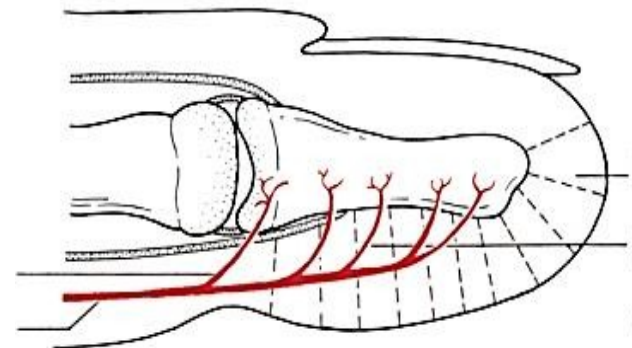
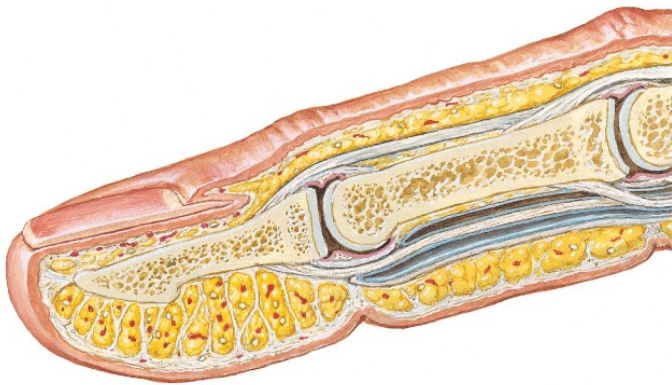
**Mid-palmar compartment**



**Thenar compartment**

## **Pulp space:**

\* It is the space which lies over the palmar surface of the terminal (distal) phalanx, **It is** divided into separate loculi that contain subcutaneous fat. Its infection is very painful due to accumulation of pus in narrow spaces under tension



# Muscles of the hand



■ Intrinsic muscles of the hand are **20** small muscles arranged in **3** groups:

## I. Lateral group short muscles of thumb

4

- 3 Thenar muscles
- Adductor pollicis deep to

## III. Central palm muscles [small muscles of fingers] 12

- 4 Lumbricals
- 4 Palmar interossei
- 4 Dorsal interossei

## II. Medial group short muscles of little finger

4

- 3 Hypothenar muscles
- Palmaris brevis

# lateral group [short muscles of thumb]

## 3 Thenar muscles

(form the **thenar eminence**)

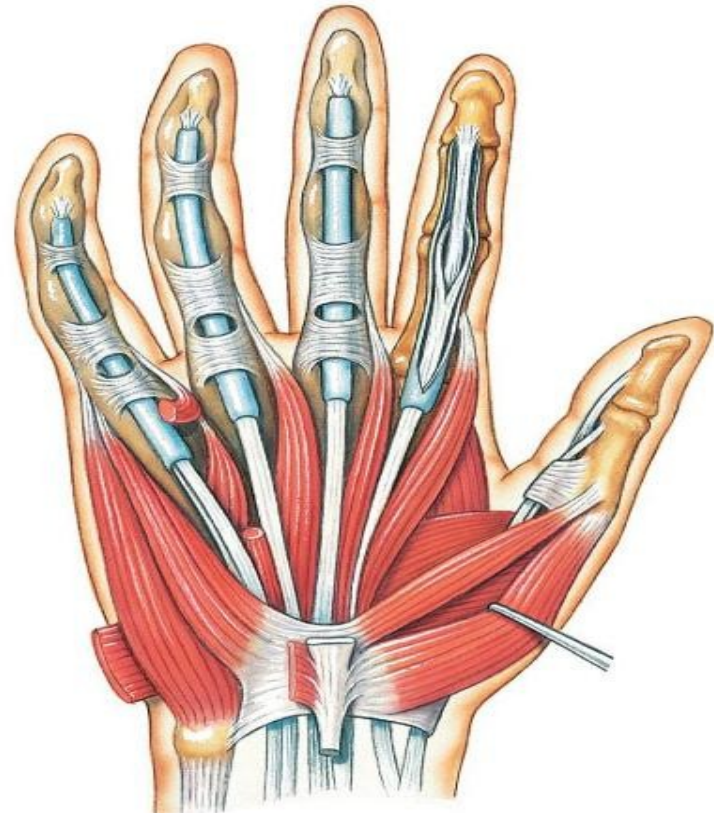
1. Abductor pollicis brevis.

2. Flexor pollicis brevis.

3. Opponens pollicis.

## 1 Adductor pollicis

deep to them.



# lateral group [short muscles of thumb]

## □ Nerve supply:

3 thenar Muscles □ lateral terminal branch of Median Nerve.

Adductor pollicis □ deep terminal branch of Ulnar Nerve.

## □ Action:

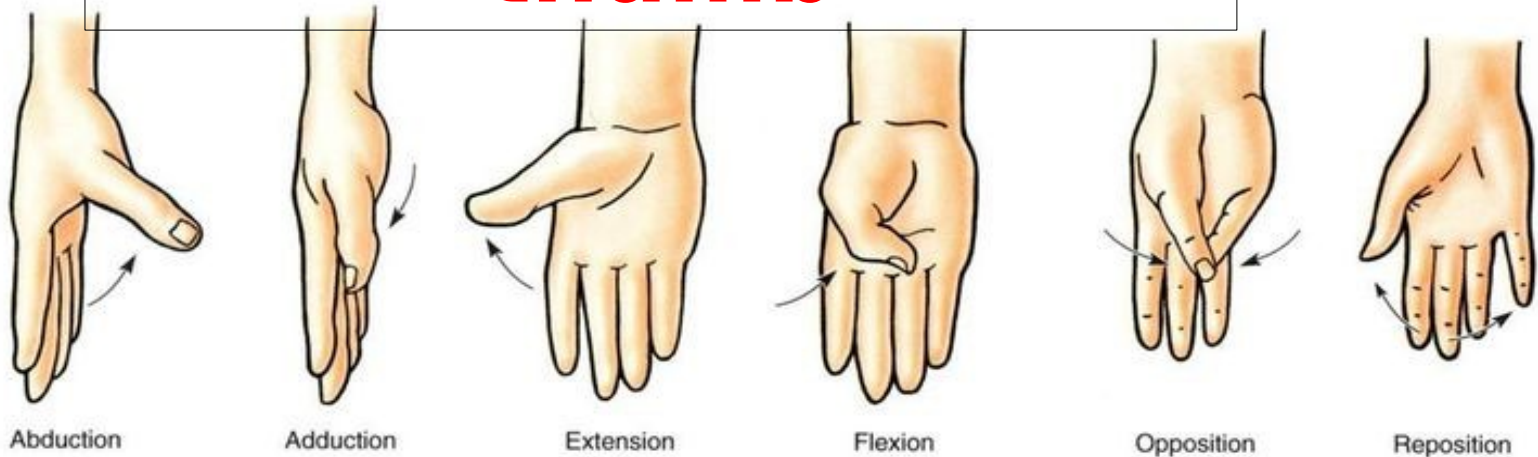
.Abductor pollicis brevis ⇒ Abducts the thumb.

.Flexor pollicis brevis ⇒ Flexes the thumb.

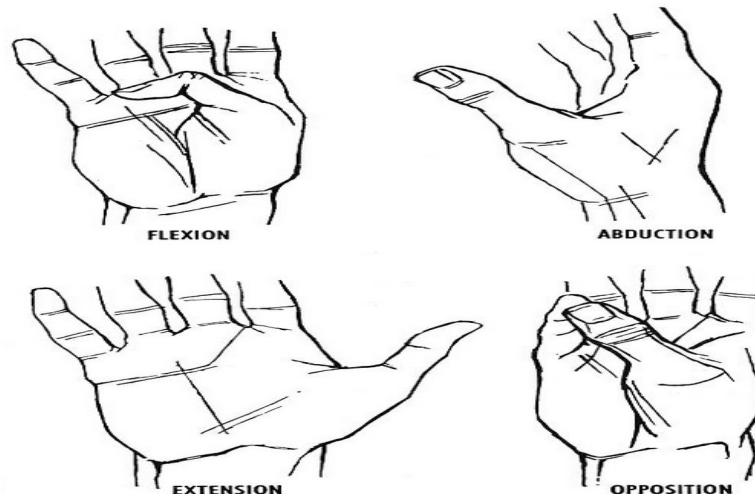
.Opponens pollicis ⇒ Opposition of thumb (i.e. pulls the thumb medially & forward across the palm so the palmar surface of the tip of thumb comes in contact with the tips of other fingers)

[opposition & counting fingers] It is also used in

# Movements of the thumb



Clinical anatomy by region (Snell)



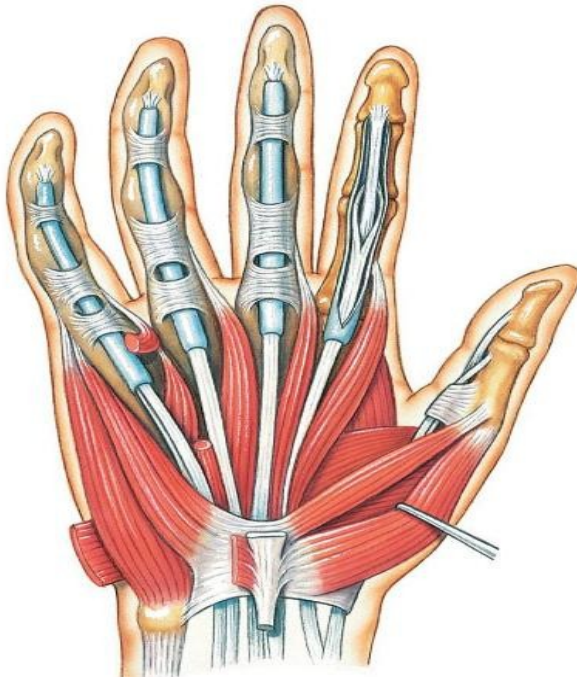


## II. Medial group [short muscles of little finger

### 2. Hypothenar muscles :

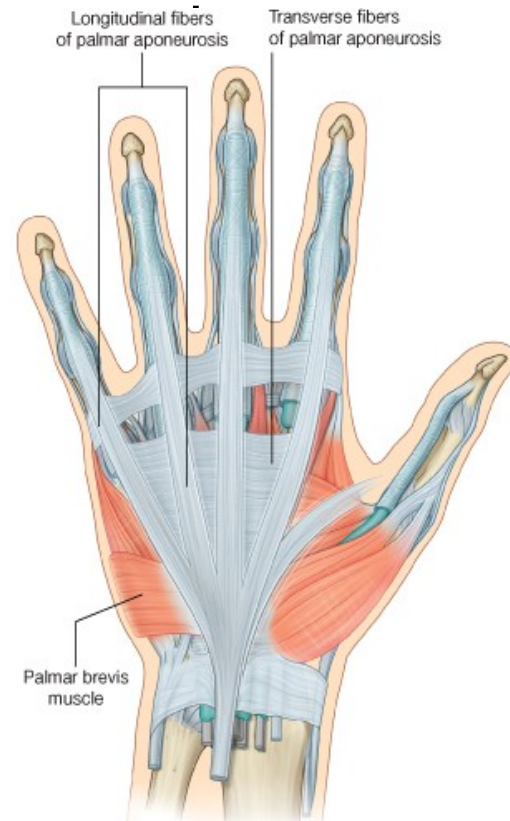
1. Abductor digiti minimi.
2. Flexor digiti minimi.

### 3. Oppo minimi



### 1. Palmaris brevis

superficial to



# Palmaris brevis



lies in superficial fascia, superficial to hypothenar Ms.

■ It is thin sheet of subcutaneous muscle that covers the proximal part of hypothenar muscles.

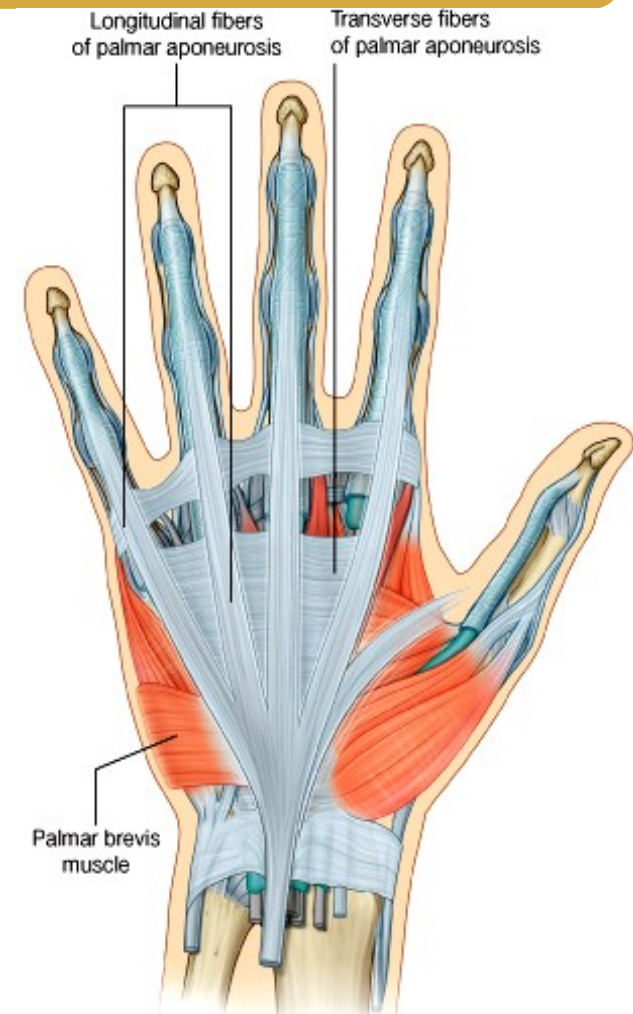
## .Origin:

Medial margin of the palmar aponeurosis & flexor retinaculum.

## .Insertion:

Skin of the medial (ulnar) border of the hand.

.Action: Deepen the hollow of the palm to improve grip of



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## II. Medial group [short muscles of little finger]



### ■ Nerve supply:

**3** hypothenar muscles □ deep terminal branch of ulnar nerve.

Palmaris brevis □ superficial terminal branch of ulnar nerve.

### ■ **Action:**

.Abductor digiti minimi ⇒ Abducts the little finger.

.Flexor digiti minimi ⇒ Flexes the little finger.

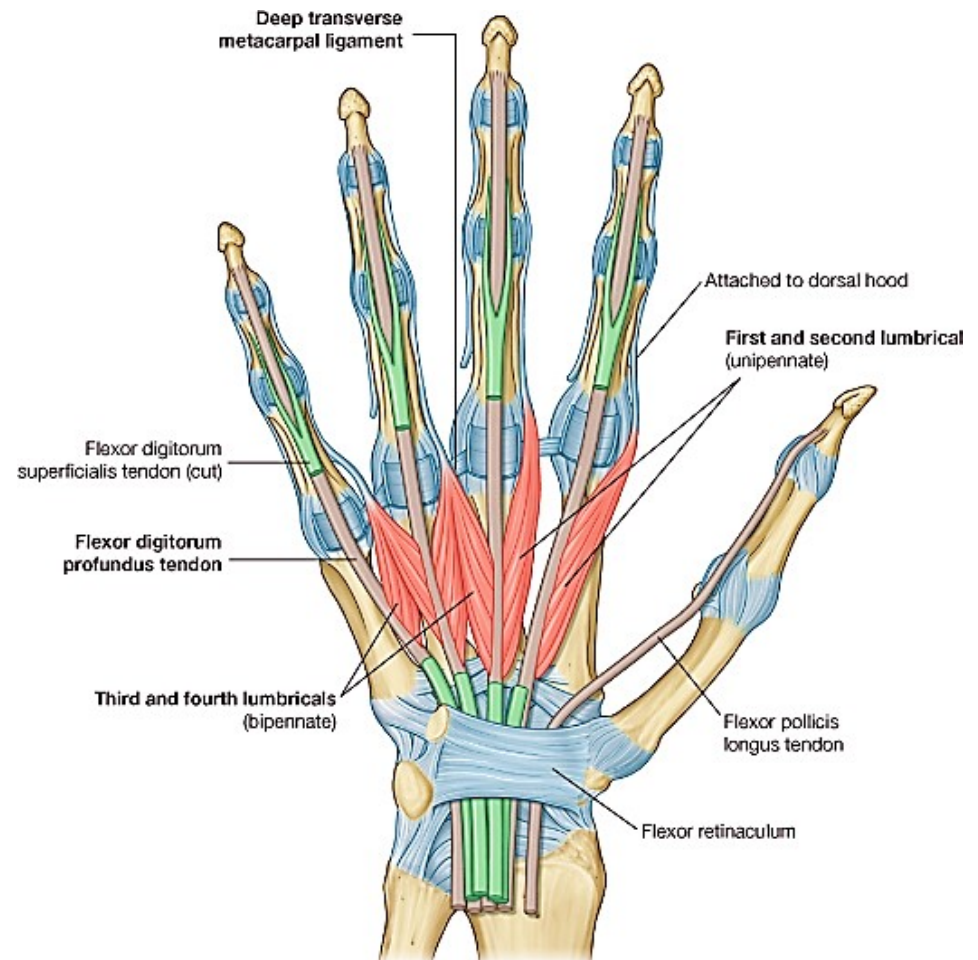
.Opponens digiti minimi : metacarpal bone forwards & to deepen the hollow of gripping.



# III. Central palm muscles [small muscles of fingers] 12



- **4 Lumbricals**
- **4 Palmar interossei**
- **4 Dorsal interossei.**



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# Lumbrical muscles

- ✓ 4 small muscles arranged 1<sup>st</sup> - 4<sup>th</sup> from lateral to medial
- ✓ have **No** bony attachments.

- ✓ **Origin:** Tendons of Flexor Digitorum Profundus

- 1<sup>st</sup> & 2<sup>nd</sup> lumbricals

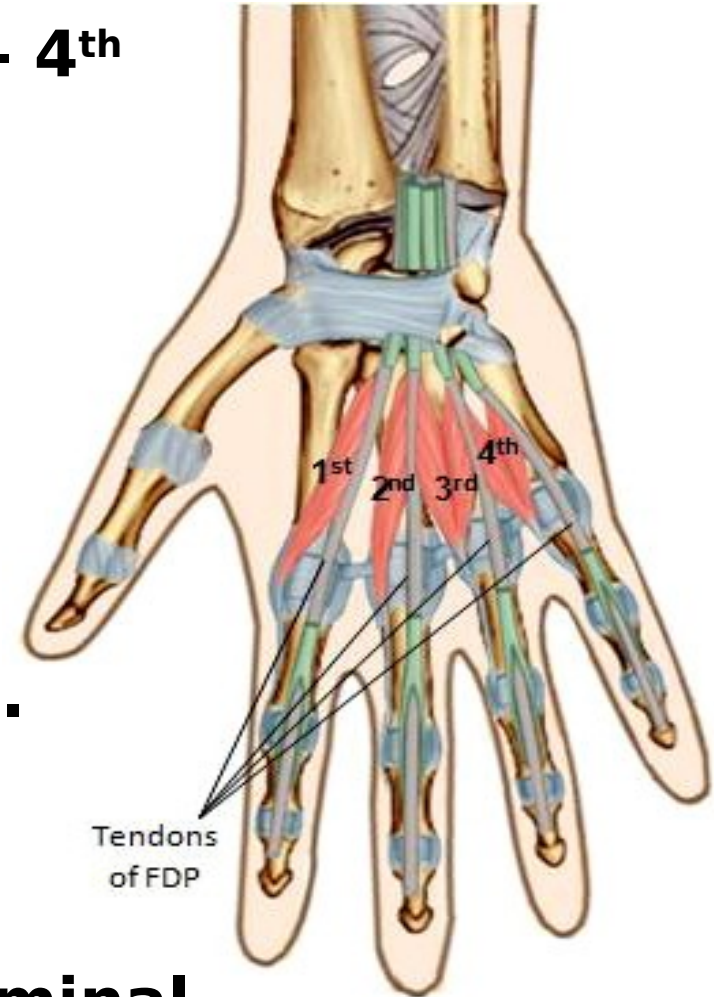
- Are unipennate.

- are supplied by median nerve.

- 3<sup>rd</sup> & 4<sup>th</sup> lumbricals

- are bipennate.

- are supplied by the deep **terminal** branch of ulnar nerve.



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# Lumbrical muscles

## Insertion:

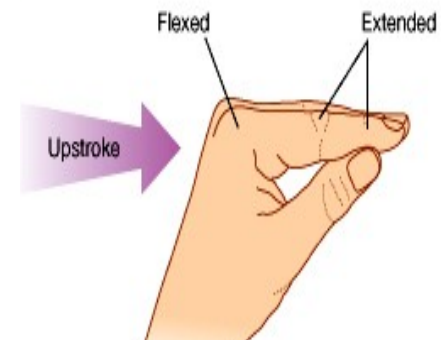
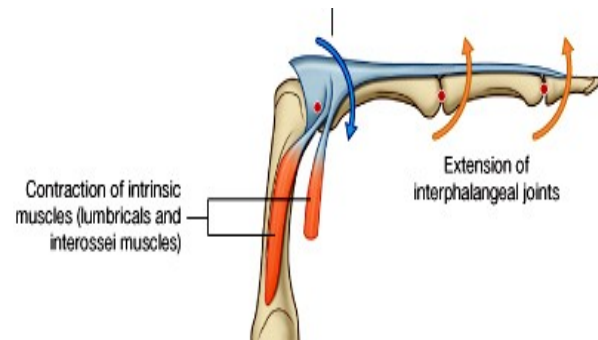
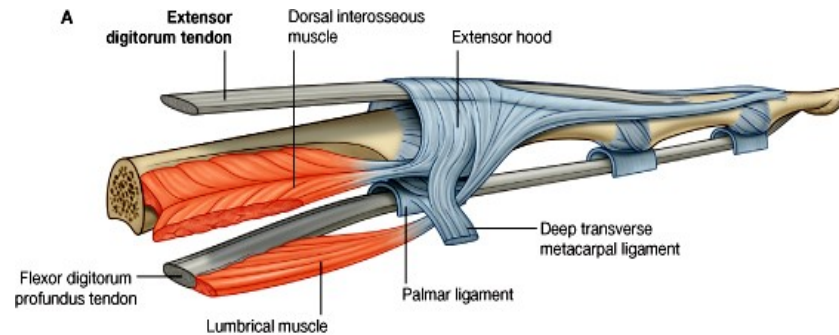
the lateral side of the **extensor expansion** of the corresponding finger [Medial 4 fingers].

## Action:

Together with interossei →

Put the fingers in writing position

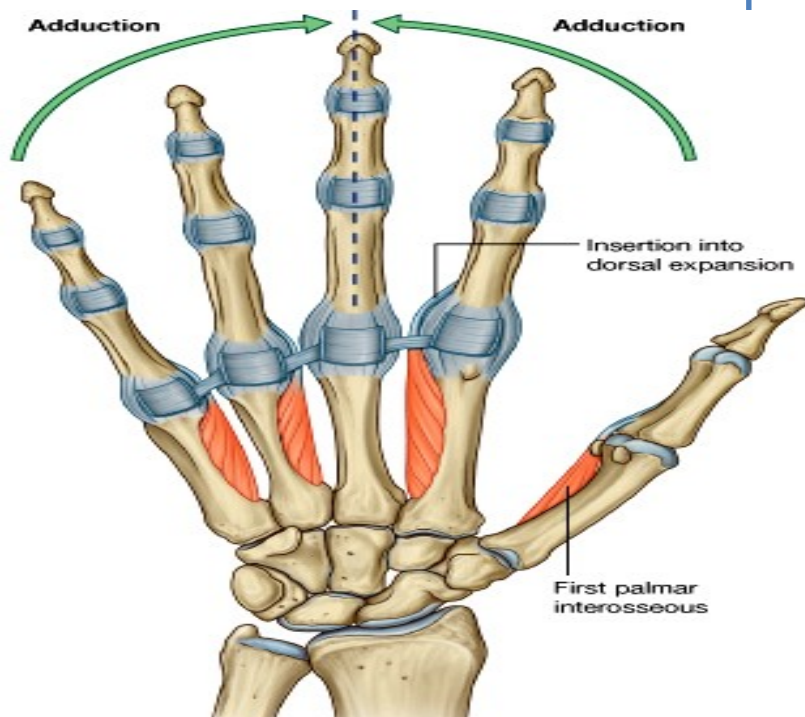
- Flex M-P joints
  - extend I-P joints
- through the **extensor**



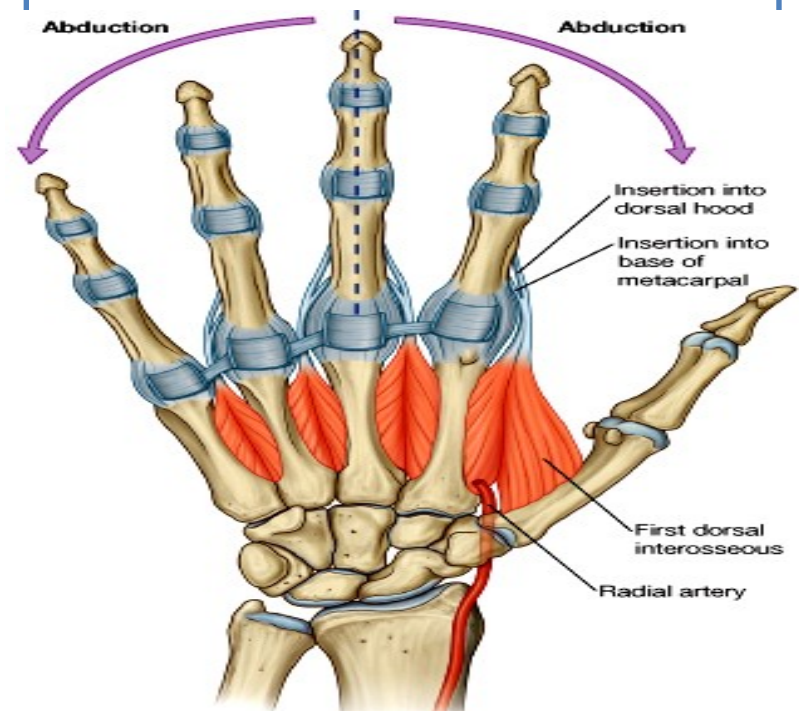
# III. Central palm muscles [small muscles of fingers] 12



## ➤ 4 Palmar interossei



## ➤ 4 Dorsal interossei.



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new five year program  
**Palmar interossei (uni** **Dorsal interossei (bi-pennat**

## ❑ NERVE SUPPLY :

All the interossei ❑ Ulnar Nerve (deep terminal branch).

## ❑ ACTION:

1.Palmar interossei ❑ ADDUCT the fingers towards the axis of the middle finger (**Pad**).

2.Dorsal interossei ❑ ABDUCT the fingers from the axis of the middle finger (**Dab**).

3.Lumbricals & all interossei ❑ flex M-P joints & extend I-P joints ⇒ Put the fingers in the

● Notice that abduction & adduction of fingers are towards the **line of middle finger**.

# ***EXTENSOR RETINACULUM***

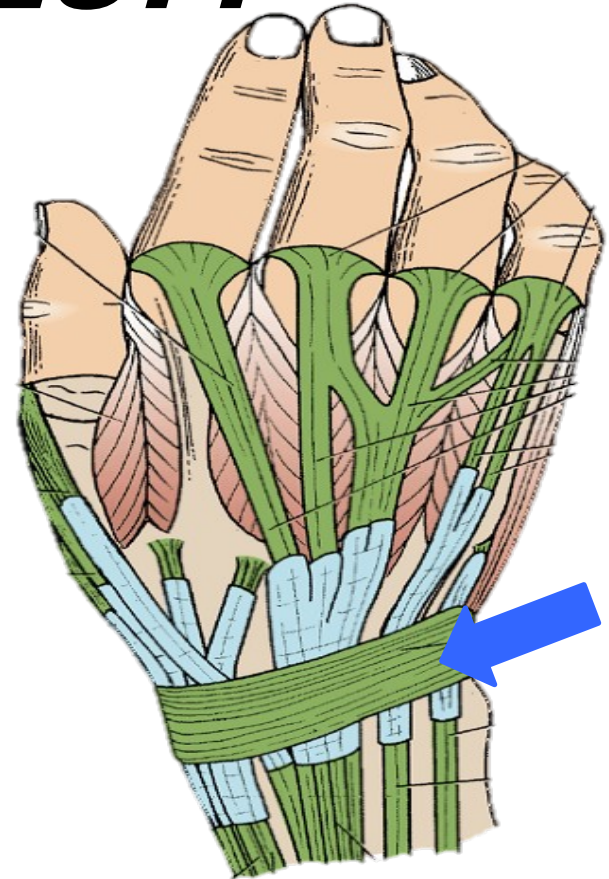
- ❑ **Definition** → *it is fibrous band*
- ❑ **Site** → *extend obliquely across the back of wrist.*
- ❑ **Attachement** →

***Medially :***

pisiform & triquetral bones.

***Laterally :***

anterior border to lower end of radius



Clinical anatomy by region (Snell)



# ***EXTENSOR RETINACULUM***

## ***Structures superficial to the retinaculum:***

- ***1. The superficial terminal branch of the radial nerve.  
Laterally***
- ***2. Beginning of the cephalic vein.***
- ***3. Beginning of the basilic vein.  
Medially***
- ***4. The dorsal (cutaneous) branch of the ulnar nerve.***

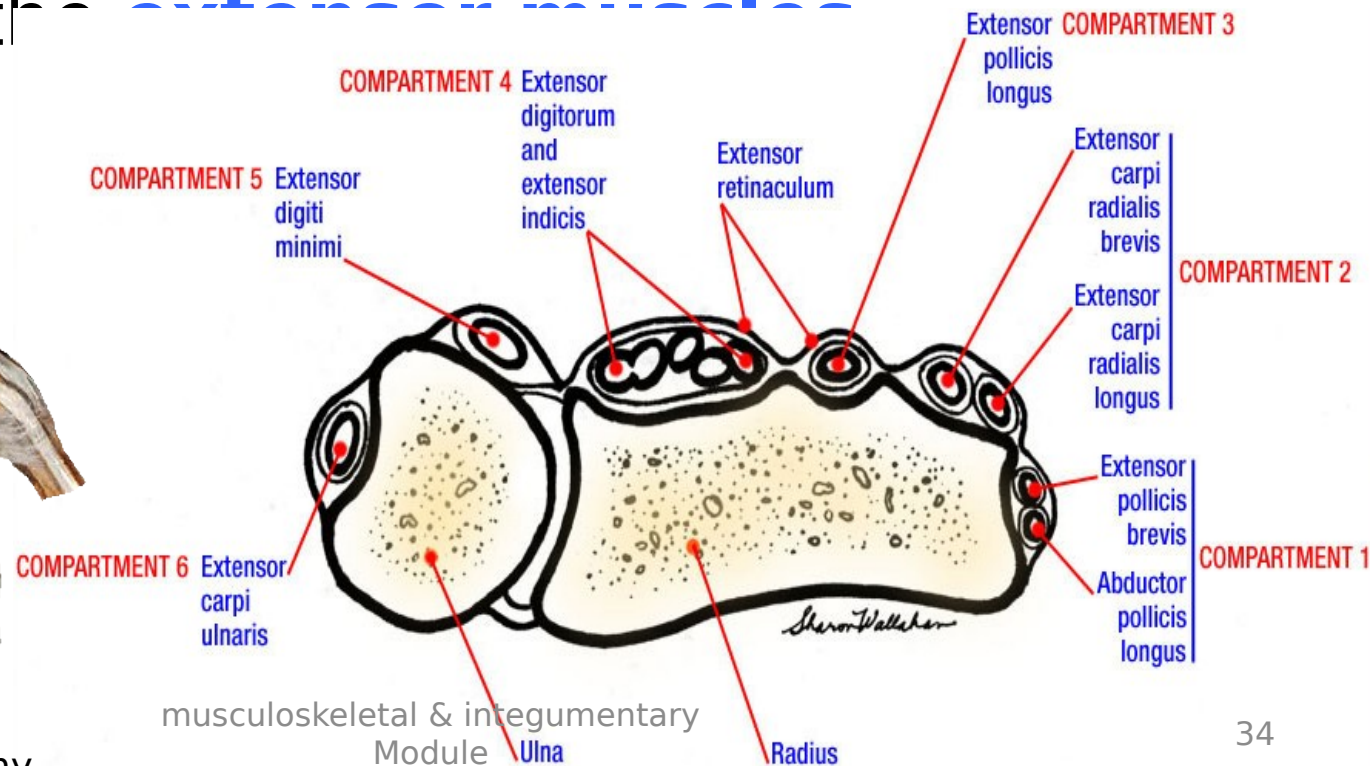




# EXTENSOR

## Structures deep to the retinaculum:

Beneath the extensor retinaculum, fibrous septa pass to the underlying radius and ulna and form six compartments that contain the tendons of the

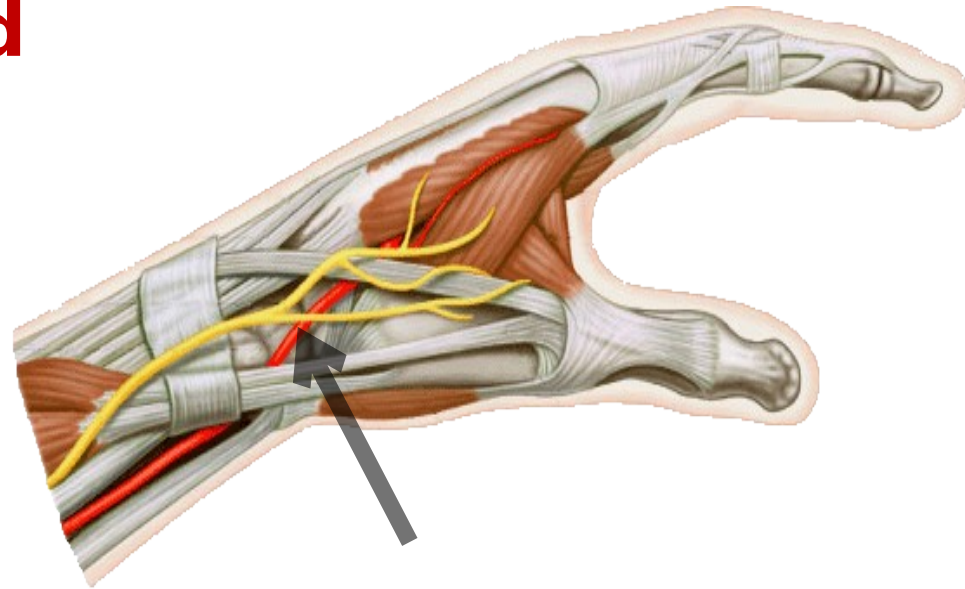
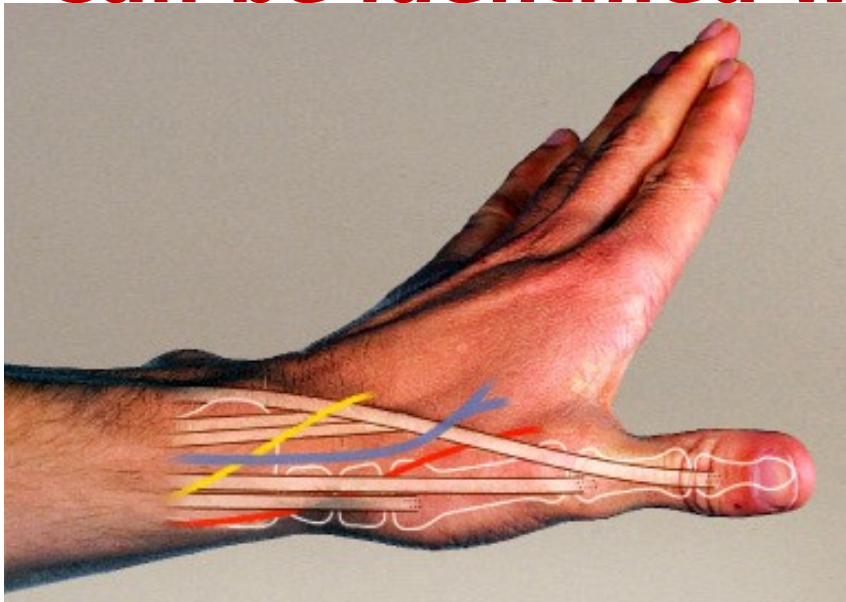


# Anatomical “snuff box”



**Position:** It is a hollow on the lateral part of the wrist.

**Can be identified when the thumb is**



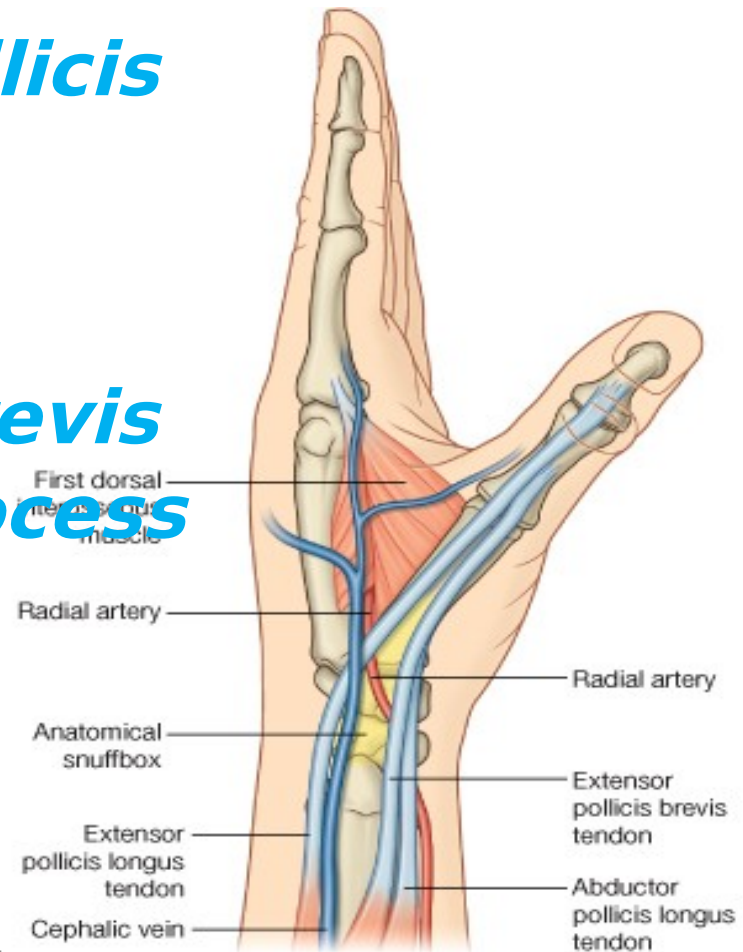
**Radial artery** crosses the floor of the snuff, so may feel the radial pulse in this fossa

# Anatomical “snuff box”



## Boundaries of Anatomical “snuff box”

- **Medial:** *extensor pollicis longus*
- **Lateral:** *abductor pollicis longus*  
*extensor pollicis brevis*
- **Proximal:** *styloid process of radius*
- **Floor:** *scaphoid trapezium*



# Lecture Quiz



**Which of the following lies deep to the flexor retinaculum?**

**Palmar branch of the ulnar nerve**

**Median nerve**

**Ulnar vessels**

**Tendon of palmaris longus**

**Tendon of flexor carpi radialis**

**Palmar aponeurosis:**

**The degenerated distal part of palmaris longus muscle**

**loosely attached to the skin of the palm**

**lies beneath the long flexor tendons**

**quadrangular in shape**

**has no role in formation of the fascial spaces in the palm**

## SUGGESTED TEXTBOOKS



**Clinical Anatomy by Regions**, 9th edition,  
2011, Snell RS, Lippincott, Williams and  
Wilkins

**Atlas of Human Anatomy**, 6th edition,  
2014, Netter F.H.

**Gray's Anatomy for students**, 2nd edition,  
2011, Drake R. et al, Churchill & Livingstone